WHAT IS CLAIMED IS:

1. Method for cutting nanotubes comprising:

exposing at least one nanotube having a first length to a soft organic material; and

grinding said at least one nanotube with said soft organic material to result in at least one shortened nanotube having a length that is shorter than said first length.

2. The method of claim 1 wherein said soft organic material comprises cyclodextrin.

3. The method of claim 2 wherein said cyclodextrin comprises at least one selected from the group consisting of:

γ-cyclodextrin, α-cyclodextrin, β-cyclodextrin, δ-cyclodextrin, ε-cyclodextrin, and any derivative of at least one of the aforementioned cyclodextrins.

4. The method of claim 1 wherein said soft organic material comprises at least one selected from the group consisting of:

at least one glucopyrane, at least one monosaccharied, at least one cyclic oligosaccharide, at least one linear oligosaccharide, at least one branched oligosaccharide, at least one cyclic polysaccharide, at least one linear polysaccharide, and at least one branched polysaccharide.

5. The method of claim 1 wherein said soft organic material is soluble.

6. The method of claim 5 further comprising:

solubilizing said soft organic material to separate said at least one shortened nanotube from said soft organic material.

7. The method of claim 1 wherein said soft organic material is a dispersing reagent capable of dispersing a plurality of solid-state nanotubes.

8. The method of claim 1 wherein said first length is the length of said at least one nanotube as produced.

9. The method of claim 1 wherein said first length is at least 1 micrometer (μm).

10. The method of claim 1 wherein said first length is less than 1 micrometer (μm).

11. The method of claim 1 wherein said at least one nanotube comprises at least one selected from the group consisting of:

carbon nanotube, single-walled nanotube, multi-walled nanotube, and boron nitride nanotube.

12. A system for cutting nanotubes comprising:

at least one nanotube having a first length;

soft organic material; and

grinding mechanism operable to apply force against said at least one nanotube and soft organic material to cut said at least one nanotube to produce at least two nanotubes each having a length shorter than said first length.

13. The system of claim 12 wherein said soft organic material comprises cyclodextrin.

14. The system of claim 13 wherein said cyclodextrin is at least one selected from the group consisting of:

γ-cyclodextrin, α-cyclodextrin, β-cyclodextrin, δ-cyclodextrin, ε-cyclodextrin, and any derivative of at least one of the aforementioned cyclodextrins.

15. The system of claim 12 wherein said soft organic material comprises at least one selected from the group consisting of:

at least one glucopyranose, at least one monosaccharide, at least one cyclic oligosaccharide, at least one linear oligosaccharide, at least one branched oligosaccharide, at least one cyclic polysaccharide, at least one linear polysaccharide, at least one branched polysaccharide, and any derivative of the aforementioned.

16. The system of claim 12 wherein said grinding mechanism comprises a mortar and pestle.

17. The system of claim 12 wherein said grinding mechanism comprises a planetary ball mill.

18. The system of claim 12 further comprising a plurality of nanotubes.

19. The system of claim 18wherein said soft organic material comprises a dispersing reagent capable of dispersing at least a portion of said plurality of nanotubes when said plurality of nanotubes are in solid-state form.

20. The system of claim 12 herein said soft organic material is soluble.

21. The system of claim 12 wherein said at least one nanotube comprises at least one carbon nanotube.

22. A system for cutting nanotubes comprising:

a plurality of nanotubes, at least one of said plurality of nanotubes having a first length;

dispersing reagent for dispersing at least a portion of said plurality of nanotubes; and

grinding mechanism operable to apply force against at least said at least one nanotube to cut said at least one nanotube to produce at least two nanotubes each having a length shorter than said first length.

23. The system of claim 22 wherein said dispersing reagent comprises cyclodextrin.

24. The system of claim 23 wherein said cyclodextrin is at least one selected from the group consisting of:

γ-cyclodextrin, α-cyclodextrin, β-cyclodextrin, δ-cyclodextrin, ε-cyclodextrin, and any derivative of at least one of the aforementioned cyclodextrins.

25. The system of claim 22 wherein said dispersing reagent comprises at least one selected from the group consisting of:

at least one glucopyranose, at least one monosaccharide, at least one cyclic oligosaccharide, at least one linear oligosaccharide, at least one branched oligosaccharide, at least one cyclic polysaccharide, at least one linear polysaccharide, at least one branched polysaccharide, and any derivative of the aforementioned.

26. The system of claim 22 wherein said grinding mechanism comprises a mortar and pestle.

27. The system of claim 22 wherein said grinding mechanism comprises a planetary mill.

28. The system of claim 22 wherein said dispersing reagent is a soft organic material.

29. The system of claim 22 wherein said dispersing reagent is soluble.

30. The system of claim 22 wherein said plurality of nanotubes comprise at least one carbon nanotube.

31. Method for cutting nanotubes comprising:

exposing at least one nanotube having a first length to a soluble organic material; and

grinding said at least one nanotube to result in at least one shortened nanotube having a length that is shorter than said first length.

32. The method of claim 31 wherein said soluble organic material comprises cyclodextrin.

33. The method of claim 32 wherein said cyclodextrin comprises at least one selected from the group consisting of:

γ-cyclodextrin, α-cyclodextrin, β-cyclodextrin, δ-cyclodextrin, ε-cyclodextrin, and any derivative of at least one of the aforementioned cyclodextrins.

34. The method of claim 31 wherein said soluble organic material comprises at least one selected from the group consisting of:

at least one glucopyranose, at least one monosaccharide, at least one cyclic oligosaccharide, at least one linear oligosaccharide, at least one branched oligosaccharide, at least one cyclic polysaccharide, at least one linear polysaccharide, at least one branched polysaccharide, and any derivative of the aforementioned.

35. The method of claim 31 wherein said soluble organic material is soft.

36. The method of claim 31 wherein said soluble organic material is a dispersing reagent capable of dispersing a plurality of solid-state nanotubes.

37. The method of claim 31 wherein said first length is the length of said at least one nanotube as produced.

38. The method of claim 31 wherein said first length is at least 1 micrometer (μm).

39. The method of claim 31 wherein said grinding step further comprises:

grinding said at least one nanotube with said soluble organic material.

40. The method of claim 31 further comprising:

solubilizing said soluble organic material to separate said at least one shortened nanotube from said soluble organic material.

41. The method of claim 31 wherein said at least one nanotube comprises at least one selected from the group consisting of:

carbon nanotube, single-walled carbon nanotube, multi-walled carbon nanotube, and boron nitride nanotube.

42. Method for cutting nanotubes comprising:

presenting cyclodextrin to at least one nanotube; and

applying a force against at least said at least one nanotube to cut said at least one nanotube.

43. The method of claim 42 wherein said applying a force comprises:

grinding said at least one nanotube with said cyclodextrin.

44. The method of claim 42 wherein said presenting step comprises presenting said cyclodextrin to a plurality of nanotubes, said method further comprising:

said cyclodextrin dispersing at least a portion of said plurality of nanotubes.

45. The method of claim 42 wherein said cyclodextrin comprises at least one selected from the group consisting of:

γ-cyclodextrin, α-cyclodextrin, β-cyclodextrin, δ-cyclodextrin, ε-cyclodextrin, and any derivative of at least one of the aforementioned cyclodextrins.

46. The method of claim 42 wherein said at least one nanotube comprises at least one selected from the group consisting of:

carbon nanotube, single-walled nanotube, multi-walled nanotube, and boron nitride nanotube.

47. The method of claim 42 wherein said at least one nanotube has a diameter of at least 0.4 nm.

48. The method of claim 42 wherein said at least one nanotube has a diameter that is less than 1 nm.

49. The method of claim 48 wherein said at least one nanotube has a diameter within the range of approximately 0.4 to approximately 400 nm.

50. Method for cutting nanotubes comprising:

exposing at least one nanotube having a first length to a solid-state nanotube dispersing reagent; and

applying a force against said at least one nanotube to result in at least one shortened nanotube having a length that is shorter than said first length.

51. The method of claim 50 wherein said dispersing reagent comprises cyclodextrin.

52. The method of claim 51 wherein said cyclodextrin comprises at least one selected from the group consisting of:

γ-cyclodextrin, α-cyclodextrin, β-cyclodextrin, δ-cyclodextrin, ε-cyclodextrin, and any derivative of at least one of the aforementioned cyclodextrins.

53. The method of claim 50 wherein said dispersing reagent comprises at least one selected from the group consisting of:

at least one glucopyranose, at least one monosaccharide, at least one cyclic oligosaccharide, at least one linear oligosaccharide, at least one branched oligosaccharide, at least one cyclic polysaccharide, at least one linear polysaccharide, at least one branched polysaccharide, and any derivative of the aforementioned.

54. The method of claim 50 wherein said dispersing reagent is soluble.

55. The method of claim 50 wherein said grinding step further comprises:

grinding said at least one nanotube with said solid-state nanotube dispersing reagent.

56. The method of claim 55 wherein said dispersing reagent is soluble, further comprising:

solubilizing said dispersing reagent to separate said at least one shortened nanotube from said dispersing reagent.

57. The method of claim 50 wherein said first length is the length of said at least one nanotube as produced.

58. The method of claim 57 wherein said at least one nanotube is produced by a technique selected from the group consisting of:

a gas-phase catalytic reaction process, an electric arc process, and a laser vaporization process.

59. The method of claim 50 wherein said first length is at least 1 micrometer (μm).

60. The method of claim 50 wherein said at least one nanotube comprises at least one carbon nanotube.

61. Method for manipulating nanotubes comprising:

obtaining a plurality of nanotubes; and

presenting a solid-state nanotube dispersing reagent to said plurality of nanotubes to disperse at least a portion of said plurality of nanotubes.

62. The method of claim 61 wherein said solid-state nanotube dispersing reagent comprises cyclodextrin.

63. The method of claim 62 wherein said cyclodextrin comprises at least one selected from the group consisting of:

γ-cyclodextrin, α-cyclodextrin, β-cyclodextrin, δ-cyclodextrin, ε-cyclodextrin, and any derivative of at least one of the aforementioned cyclodextrins.

64. The method of claim 61 wherein said solid-state nanotube dispersing reagent comprises at least one selected from the group consisting of:

at least one glucopyranose, at least one monosaccharide, at least one cyclic oligosaccharide, at least one linear oligosaccharide, at least one branched oligosaccharide, at least one cyclic polysaccharide, at least one linear polysaccharide, at least one branched polysaccharide, and any derivative of the aforementioned.

65. The method of claim 61 wherein said obtaining step further comprises:

producing said plurality of nanotubes by a gas-phase catalytic reaction process.

66. The method of claim 61 wherein said obtaining step further comprises:

producing said plurality of nanotubes by an electric arc process.

67. The method of claim 61 wherein said obtaining step further comprises:

producing said plurality of nanotubes by a laser vaporization process.

68. The method of claim 61 further comprising:

grinding said at least a portion of said plurality of nanotubes to cut said at least a portion of said plurality of nanotubes.

69. The method of claim 61 wherein said dispersing reagent is soluble.

70. The method of claim 61 wherein said dispersing reagent comprises a soft organic material.

71. The method of claim 61 wherein said plurality of nanotubes comprises a plurality of carbon nanotubes.

72. Method for dissolution of nanotubes comprising:

presenting a nanotube-dispersing reagent to a plurality of nanotubes in at least one solvent; and

using said nanotube-dispersing reagent to disperse at least a portion of said plurality of nanotubes.

73. The method of claim 72 wherein said nanotube dispersing reagent comprises cyclodextrin.

74. The method of claim 73 wherein said cyclodextrin comprises at least one selected from the group consisting of:

γ-cyclodextrin, α-cyclodextrin, β-cyclodextrin, δ-cyclodextrin, ε-cyclodextrin, and any derivative of at least one of the aforementioned cyclodextrins.

75. The method of claim 72 wherein said nanotube dispersing reagent comprises at least one selected from the group consisting of:

at least one glucopyranose, at least one monosaccharide, at least one cyclic oligosaccharide, at least one linear oligosaccharide, at least one branched oligosaccharide, at least one cyclic polysaccharide, at least one linear polysaccharide, at least one branched polysaccharide, and any derivative of the aforementioned.

76. The method of claim 72 wherein said plurality of nanotubes comprise at least one nanotube selected from the group consisting of:

carbon nanotube, single-walled nanotube, multi-walled nanotube, and boron nitride nanotube.

77. The method of claim 72 wherein said at least one nanotube has a diameter of at least 0.4 nm.

78. The method of claim 72 wherein said at least one solvent comprises an organic solvent.

79. The method of claim 78 wherein said organic solvent comprises at least one solvent selected from the group consisting of: acetic acid; acetone; acetonitrile; aniline; benzene; benzonitrile; benzyl alcohol; bromobenzene; bromoform; 1-butanol; 2-butanol; carbon disulfide; carbon tetrachloride; chlorobenzene; chloroform; cyclohexane; cyclohexanol; decalin; dibromethane; diethylene glycol; diethylene glycol ethers; diethyl ether; diglyme; dimethoxymethane; N,N-dimethylformamide; ethanol; ethylamine; ethylbenzene; ethylene glycol ethers; ethylene glycol; ethylene oxide; formaldehyde; formic acid; glycerol; heptane; hexane; iodobenzene; mesitylene; methanol; methoxybenzene; methylamine; methylene bromide; methylene chloride; methylpyridine; morpholine; naphthalene; nitrobenzene; nitromethane; octane; pentane; pentyl alcohol; phenol; 1-propanol; 2-propanol; pyridine; pyrrole; pyrrolidine; quinoline; 1,1,2,2-tetrachloroethane; tetrachloroethylene; tetrahydrofuran; tetrahydropyran; tetralin; tetramethylethylenediamine; thiophene; toluene; 1,2,4-trichlorobenzene; 1,1,1-trichloroethane; 1,1,2-trichloroethane; trichloroethylene; triethylamine; triethylene glycol dimethyl ether; 1,3,5-trimethylbenzene; m-xylene; o-xylene; p-xylene; 1,2-dichlorobenzene; 1,3-dichlorobenzene; and 1,4-dichlorobenzene.

80. The method of claim 72 wherein said at least one solvent comprises an inorganic solvent.

81. The method of claim 80 wherein said inorganic solvent comprises water.

82. A method for functionalization of nanotubes, said method comprising:

presenting an organic material to a plurality of nanotubes; and

said organic material selectively noncovalently functionalizing at least one of said plurality of nanotubes based at least in part on nanotube diameter size.

83. The method of claim 82 wherein said noncovalently functionalizing comprises said organic material encaging said at least one of said plurality of nanotubes.

84. The method of claim 83 further comprising:

separating said noncovalently functionalized nanotubes based on diameter size of said organic material.

85. The method of claim 82 wherein said noncovalently functionalizing comprises forming at least one rotaxane complex.

86. The method of claim 82 wherein said noncovalently functionalizing enables dissolution of said at least one of said plurality of nanotubes in at least one solvent.

87. The method of claim 82 wherein said at least one solvent comprises an organic solvent comprises at least one solvent selected from the group consisting of: acetic acid; acetone; acetonitrile; aniline; benzene; benzonitrile; benzyl alcohol; bromobenzene; bromoform; 1-butanol; 2-butanol; carbon disulfide; carbon tetrachloride; chlorobenzene; chloroform; cyclohexane; cyclohexanol; decalin; dibromethane; diethylene glycol; diethylene glycol ethers; diethyl ether; diglyme; dimethoxymethane; N,N-dimethylformamide; ethanol; ethylamine; ethylbenzene; ethylene glycol ethers; ethylene glycol; ethylene oxide; formaldehyde; formic acid; glycerol; heptane; hexane; iodobenzene; mesitylene; methanol; methoxybenzene; methylamine; methylene bromide; methylene chloride; methylpyridine; morpholine; naphthalene; nitrobenzene; nitromethane; octane; pentane; pentyl alcohol; phenol; 1-propanol; 2-propanol; pyridine; pyrrole; pyrrolidine; quinoline; 1,1,2,2-tetrachloroethane; tetrachloroethylene; tetrahydrofuran; tetrahydropyran; tetralin; tetramethylethylenediamine; thiophene; toluene; 1,2,4-trichlorobenzene; 1,1,1-trichloroethane; 1,1,2-trichloroethane; trichloroethylene; triethylamine; triethylene glycol dimethyl ether; 1,3,5-trimethylbenzene; m-xylene; o-xylene; p-xylene; 1,2-dichlorobenzene; 1,3-dichlorobenzene; and 1,4-dichlorobenzene.

88. The method of claim 86 wherein said at least one solvent comprises an inorganic solvent.

89. The method of claim 82 wherein said organic material comprises cyclodextrin.

90. The method of claim 89 wherein said cyclodextrin comprises at least one selected from the group consisting of:

γ-cyclodextrin, α-cyclodextrin, β-cyclodextrin, δ-cyclodextrin, ε-cyclodextrin, and any derivative of at least one of the aforementioned cyclodextrins.

91. The method of claim 82 wherein said organic material comprises at least one selected from the group consisting of:

at least one glucopyranose, at least one monosaccharide, at least one cyclic oligosaccharide, at least one linear oligosaccharide, at least one branched oligosaccharide, at least one cyclic polysaccharide, at least one linear polysaccharide, at least one branched polysaccharide, and any derivative of the aforementioned.

92. The method of claim 82 wherein said organic material comprises at least one macrocyclic compound.

93. The method of claim 92 wherein said at least one macrocyclic compound contains at least one selected from the group consisting of:

at least one glucopyranose unit, and at least one monosaccharide unit.

94. The method of claim 82 wherein said plurality of nanotubes comprise at least one nanotube selected from the group consisting of:

carbon nanotube, single-walled nanotube, multi-walled nanotube, and boron nitride nanotube.

95. The method of claim 82 wherein said plurality of nanotubes include nanotubes that have diameters of at least 0.4 nm.